Real-Time Water Quality Deployment Report

Rattling Brook Network

January 20, 2011 – February 24, 2011

Newfoundland Labrador

Government of Newfoundland & Labrador
Department of Environment and Conservation
Water Resources Management Division
St. John's, NL, A1B 4J6 Canada

Newfoundland Labrador

Real-Time Water Quality Deployment Report

Station Code and Name

Deployment Interval

General

- Department of Environment and Conservation staff monitors the real-time web pages consistently.
- Big Pond and Bridge stations were deployed on January 21st and removed on February 24th for a deployment interval of 33 days. However, the instrument at Plant Discharge station was switched out on January 20th and removed on February 24th for a 34 day deployment.
- A two day communication dropout at Plant Discharge station beginning on February 15th left a gap in graphs. Data backup exists, but was not available at report time. This data will be included in the 2011 annual report.

Maintenance and Calibration of Instrument

- As part of the Quality Assurance and Quality Control protocol (QAQC), an assessment of the reliability of data recorded by an instrument is made at the beginning and end of the deployment period.
  - A QA/QC Sonde is temporarily deployed along side the Field Sonde. Values for temperature, pH, conductivity, dissolved oxygen, and turbidity are compared between the two instruments. Based on the degree of difference between parameters recorded by both sondes, a qualitative statement is made on the data quality in Table 1.

Table 1: Data Quality Statements

Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Rattling Brook Big Pond	January 20	Deployment	Excellent	Poor	Excellent	Excellent	Excellent
	February 24	Removal	Excellent	Good	Excellent	Fair	Excellent
Rattling Brook below Bridge	January 21	Deployment	Excellent	Fair	Excellent	Excellent	Excellent
	February 24	Removal	Excellent	Excellent	Excellent	Good	Excellent
Rattling Brook below Plant Discharge	January 21	Deployment	Good	Excellent	Excellent	Good	Fair
	February 24	Removal	Good	Good	Excellent	Good	Excellent

- A fault with the QAQC's pH probe is likely behind the "Poor" ranking recorded during deployment at Big Pond on January 21 (Field sonde: 5.46, QAQC: 4.0).

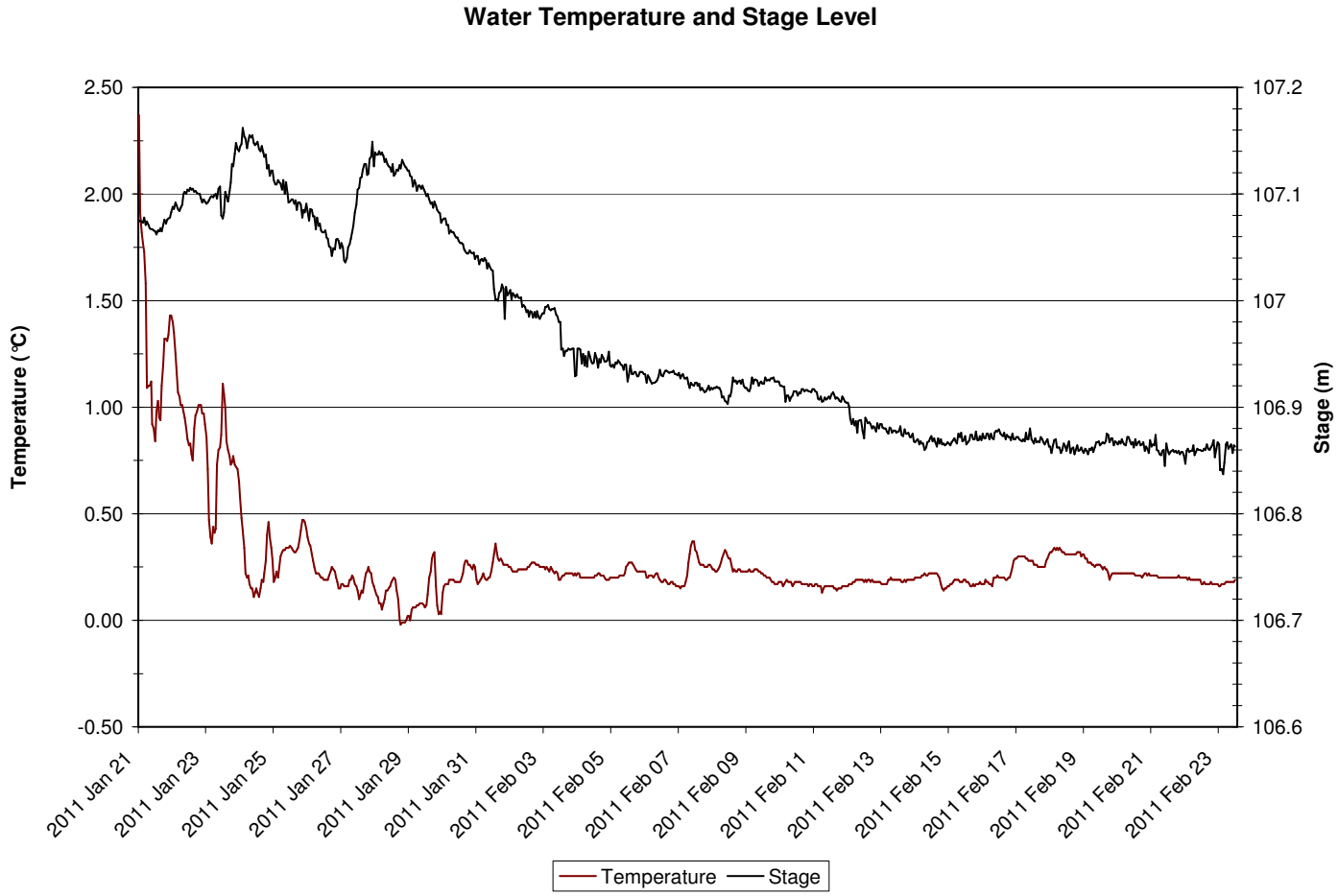
Data Interpretation

- The following graphs and discussion interprets the data for Rattling Brook Big Pond, Bridge and Plant Discharge stations for the period January 20th to February 24th, 2011.

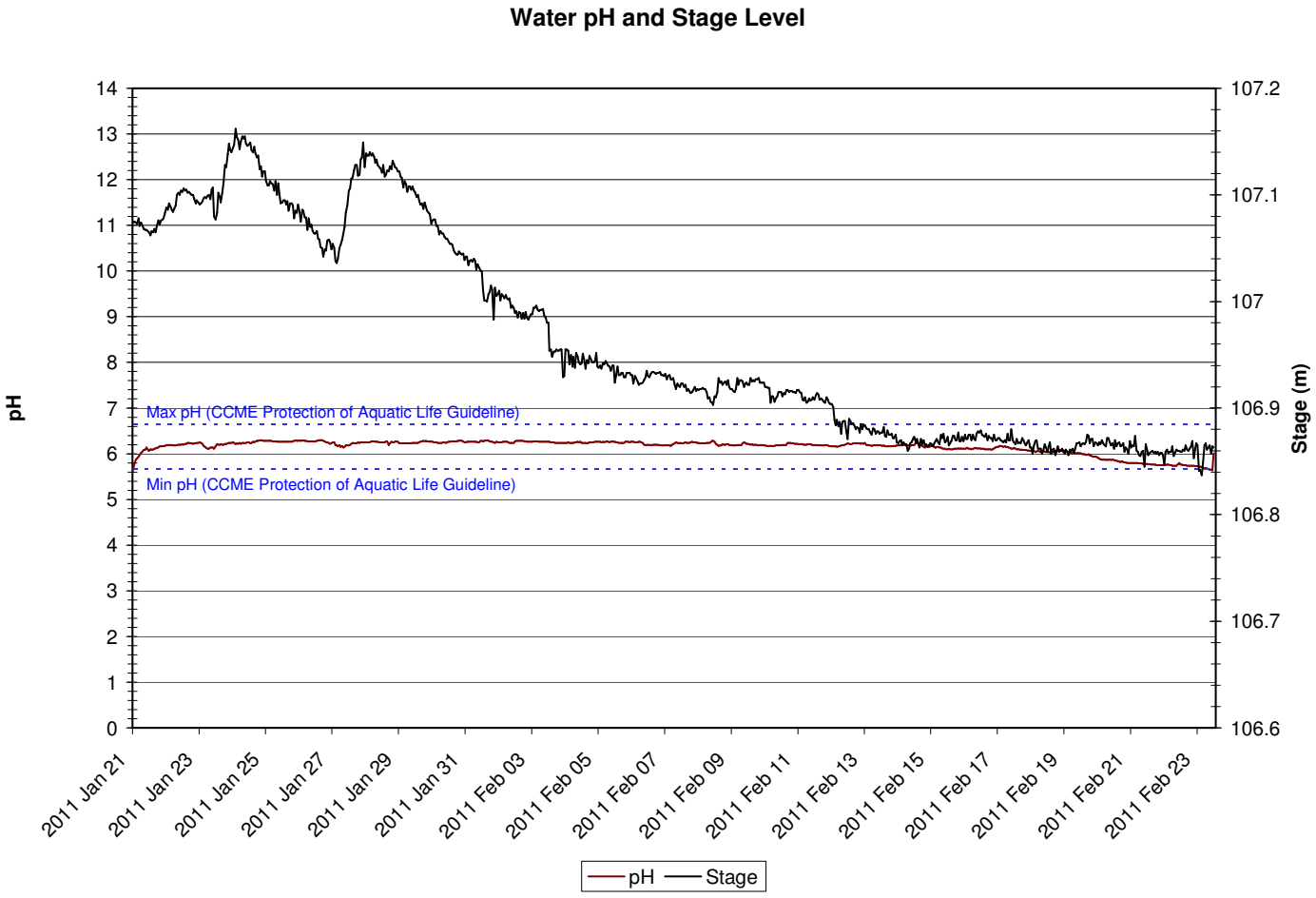
Rattling Brook Big Pond

- The instrument was deployed in ice-free conditions on January 21st but was chopped out of nearly 8 inches of ice by February 24th.

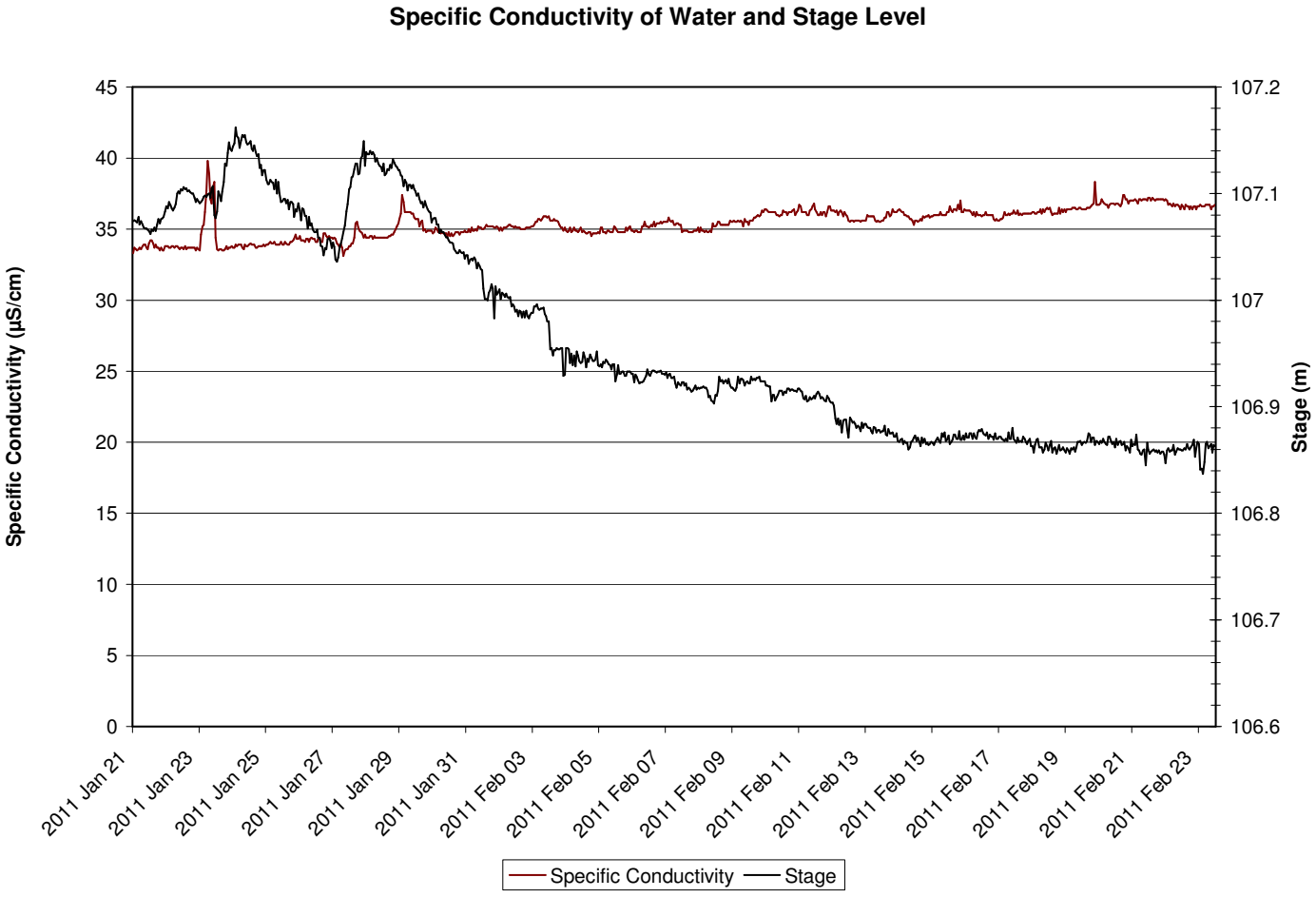
- Water temperature was found to be as high as 2.37°C early in the deployment period and fell to -0.02°C during ice cover (median = 0.21°C).



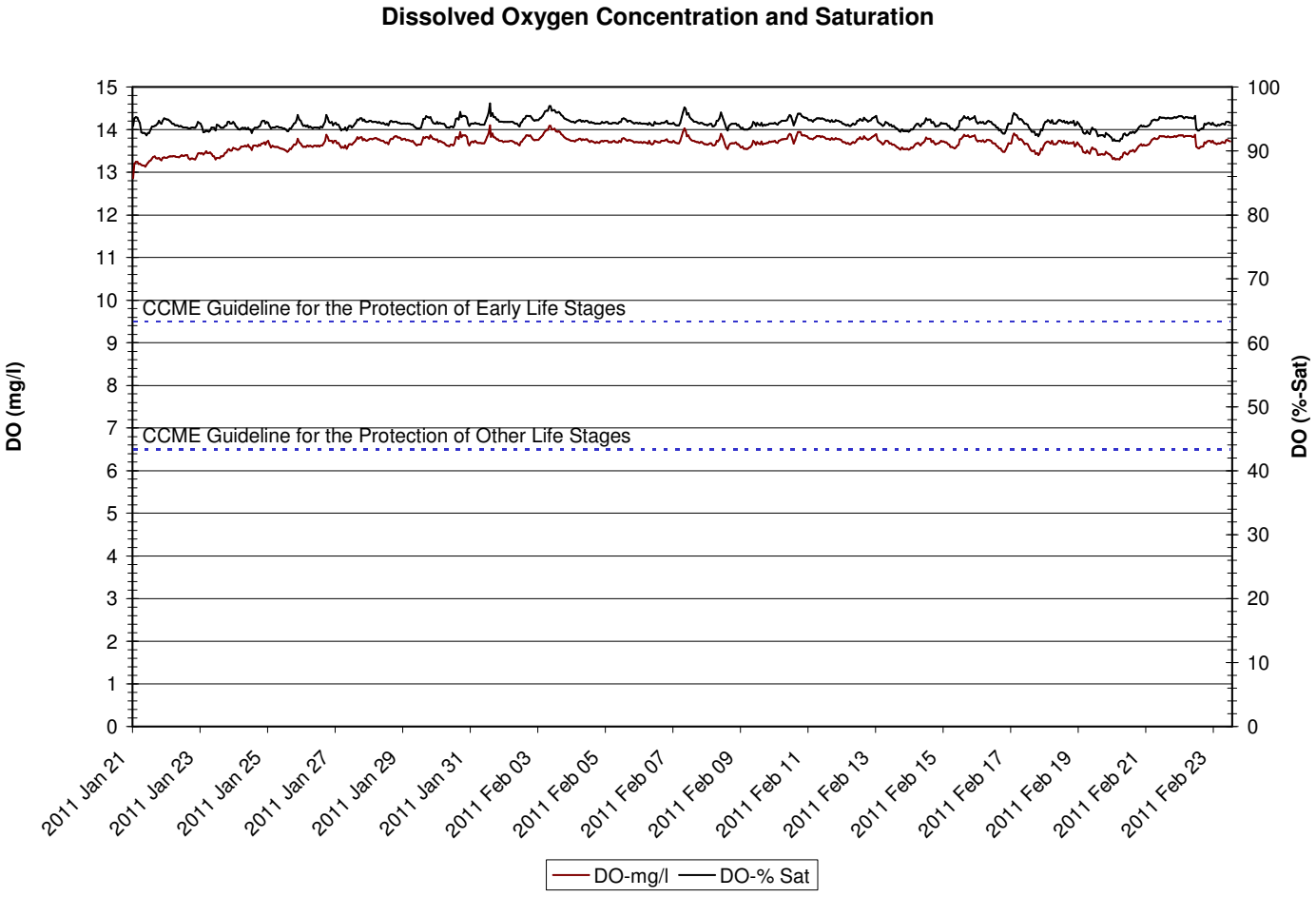
- During this deployment, pH values ranged from 6.30 to 5.64 (median = 6.20). These values predominantly fell within the SSG range of 5.67 – 6.56, except at the end of the deployment period. This should be considered normal behaviour and is not of concern.
- No events in particular were observed in pH as this parameter is especially stable during the cold winter months.



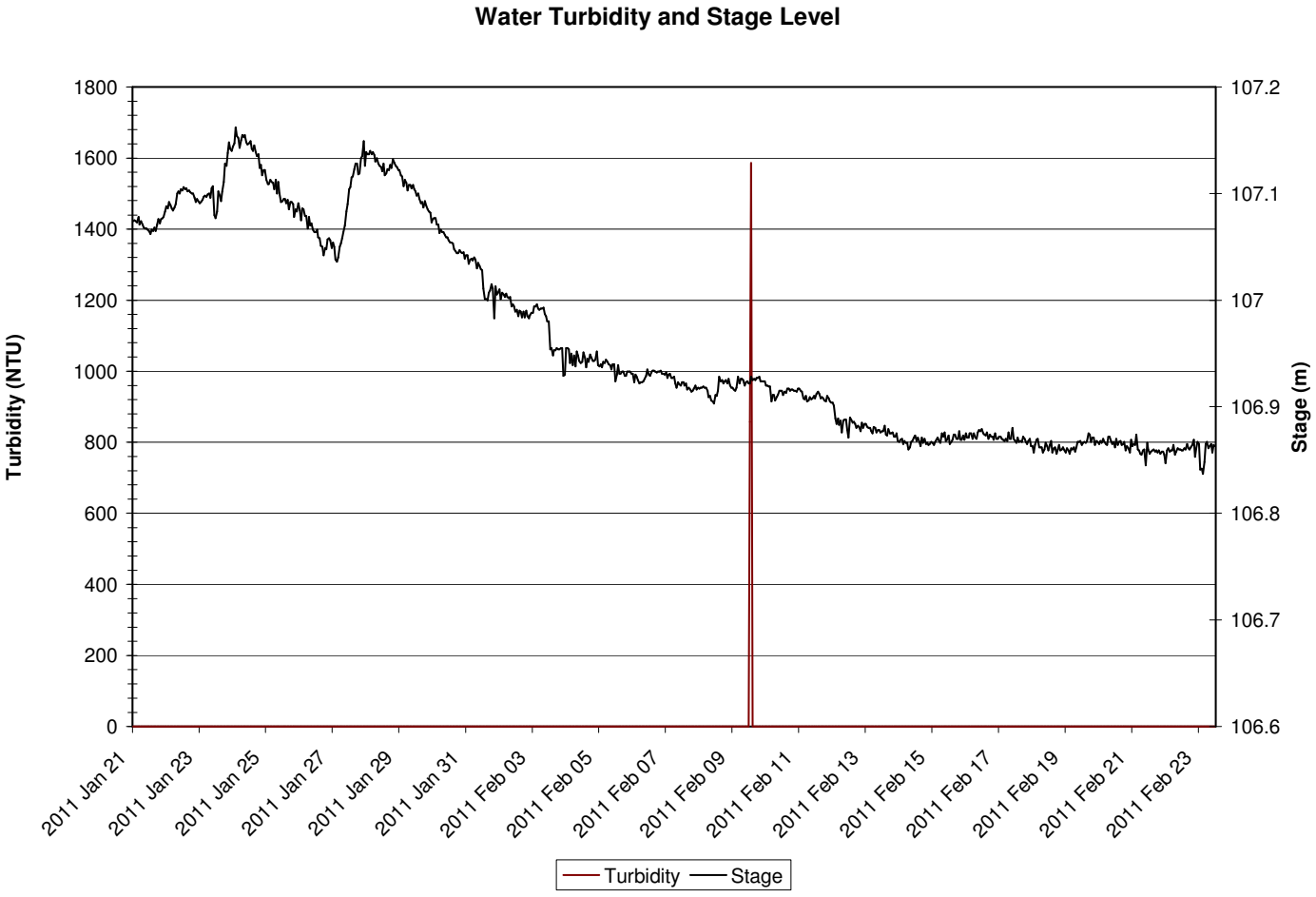
- A slight upward trend in conductivity was observed as values increased from 33.3 µS/cm at deployment to 36.7 µS/cm at removal.



- Dissolved oxygen concentration and saturation was well within CCME guidelines as expected during cold water periods. Concentrations ranged from 12.86 to 14.10 mg/l during this time period.

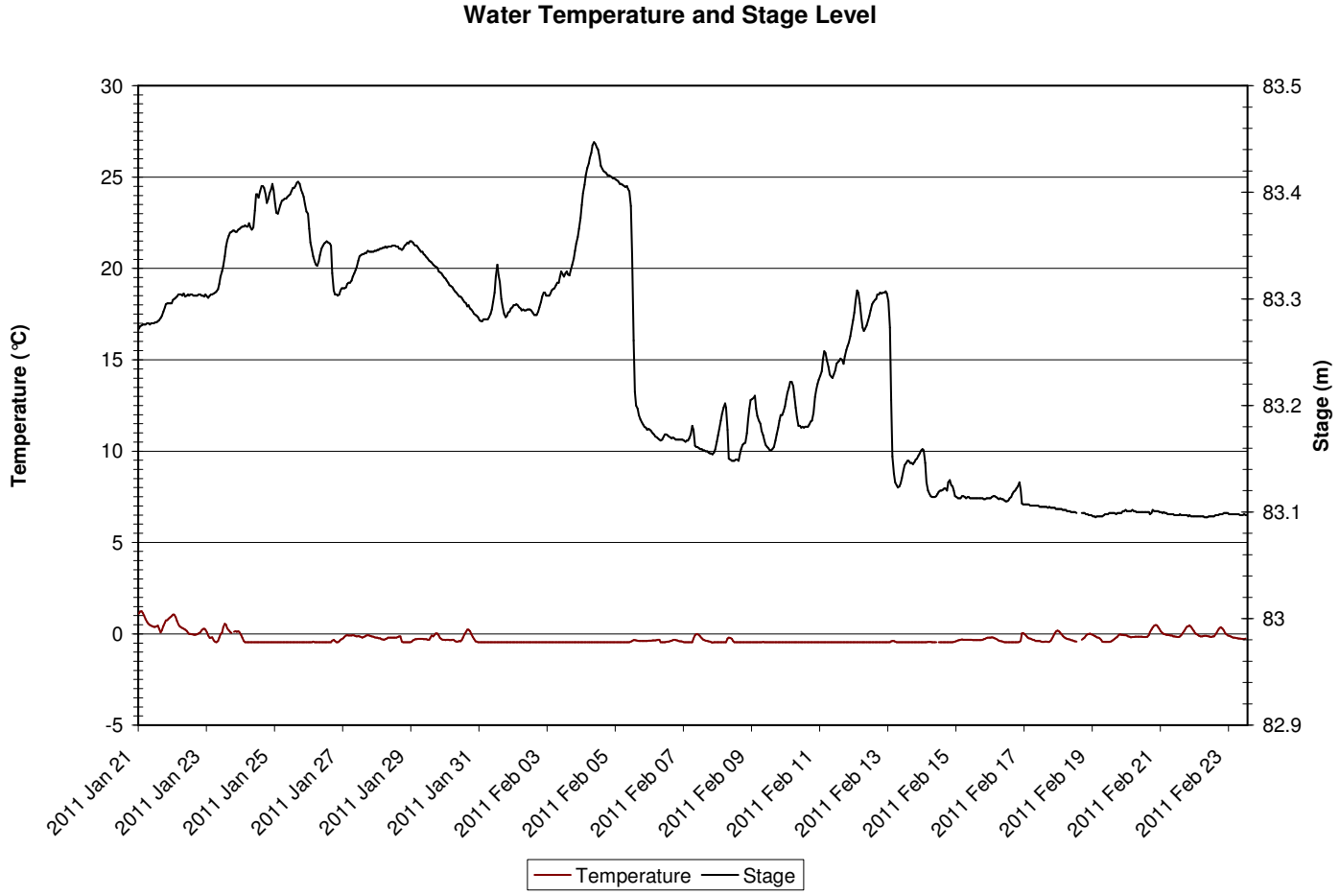


- Only two instances of turbidity above 0.0 NTU were recorded from January 21st to February 24th. The recordings, 858 and 1586 NTU were likely instances of sensor blockage due to foreign material.

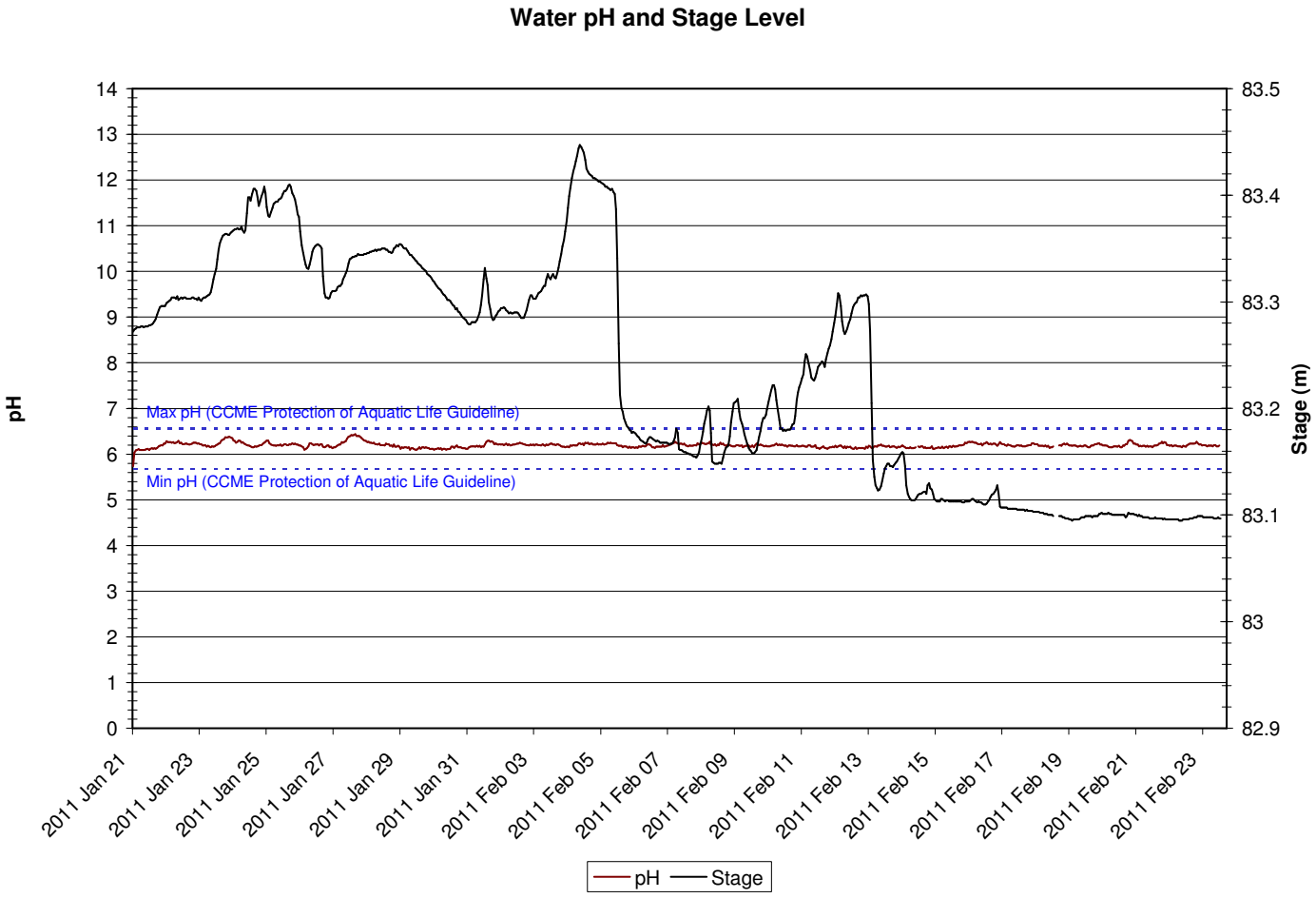


Rattling Brook below Bridge

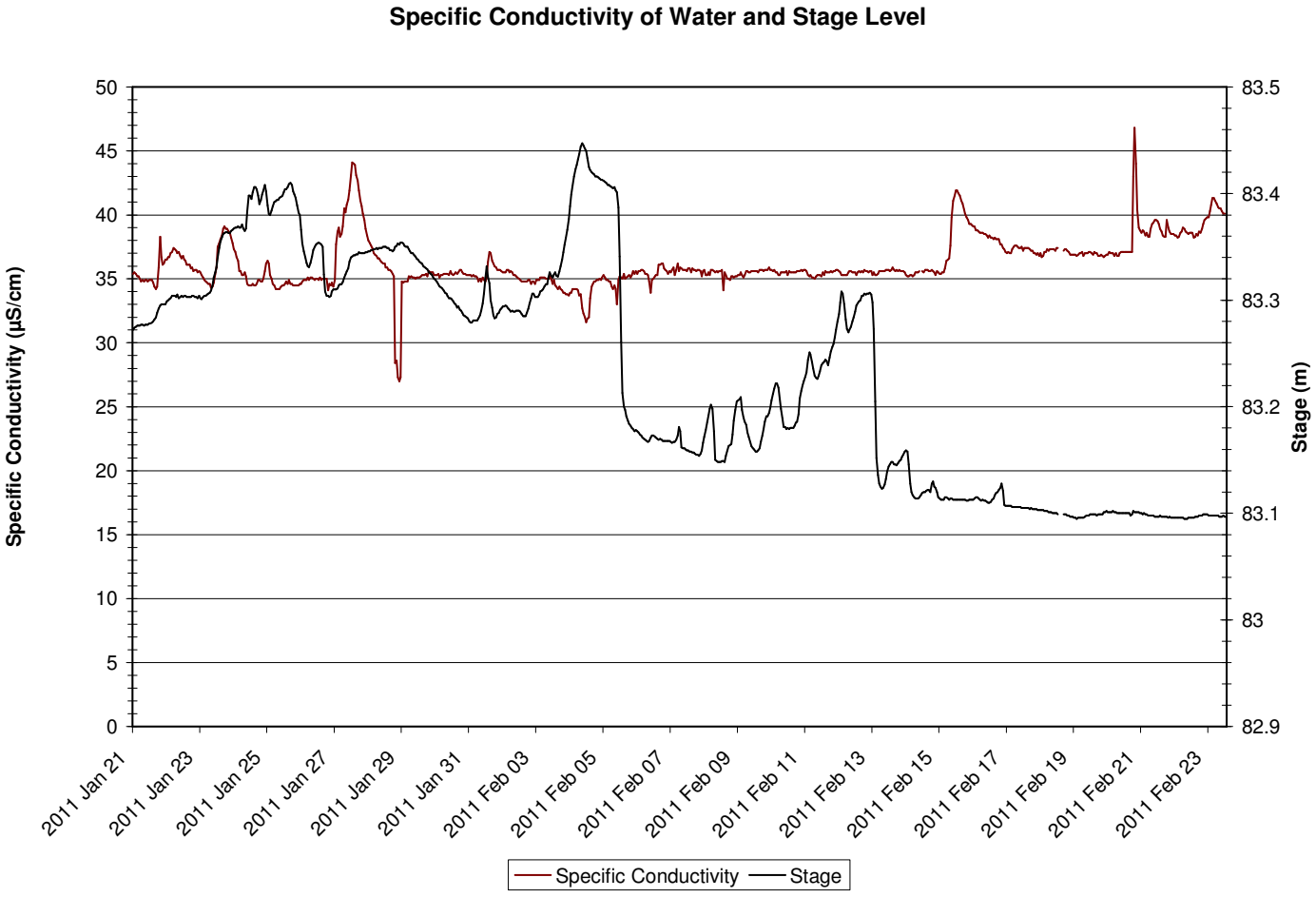
- Water temperatures were generally cooler at Bridge station with a range of 1.25 to -0.48°C (median = -0.42). This temperature difference is likely the result of shallower water with more contact with cold air than Big Pond.



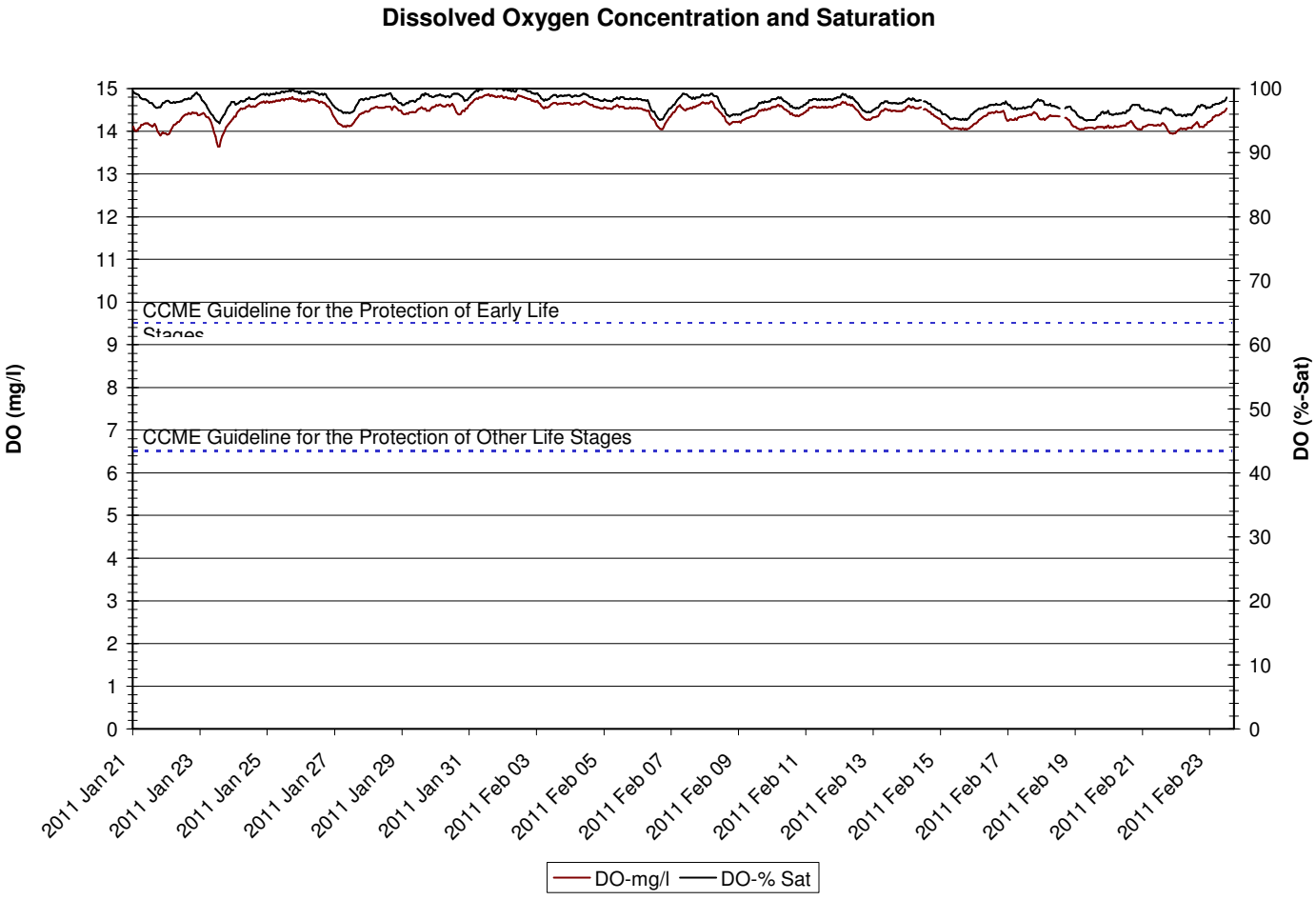
- pH at Bridge station was found to be completely within the SSG created for the Rattling Brook river system – 5.67 – 6.56. The values recorded ranged from a low of 5.74 to a maximum of 6.44 units (median = 6.19).
- No significant events were observed in pH during this time period.



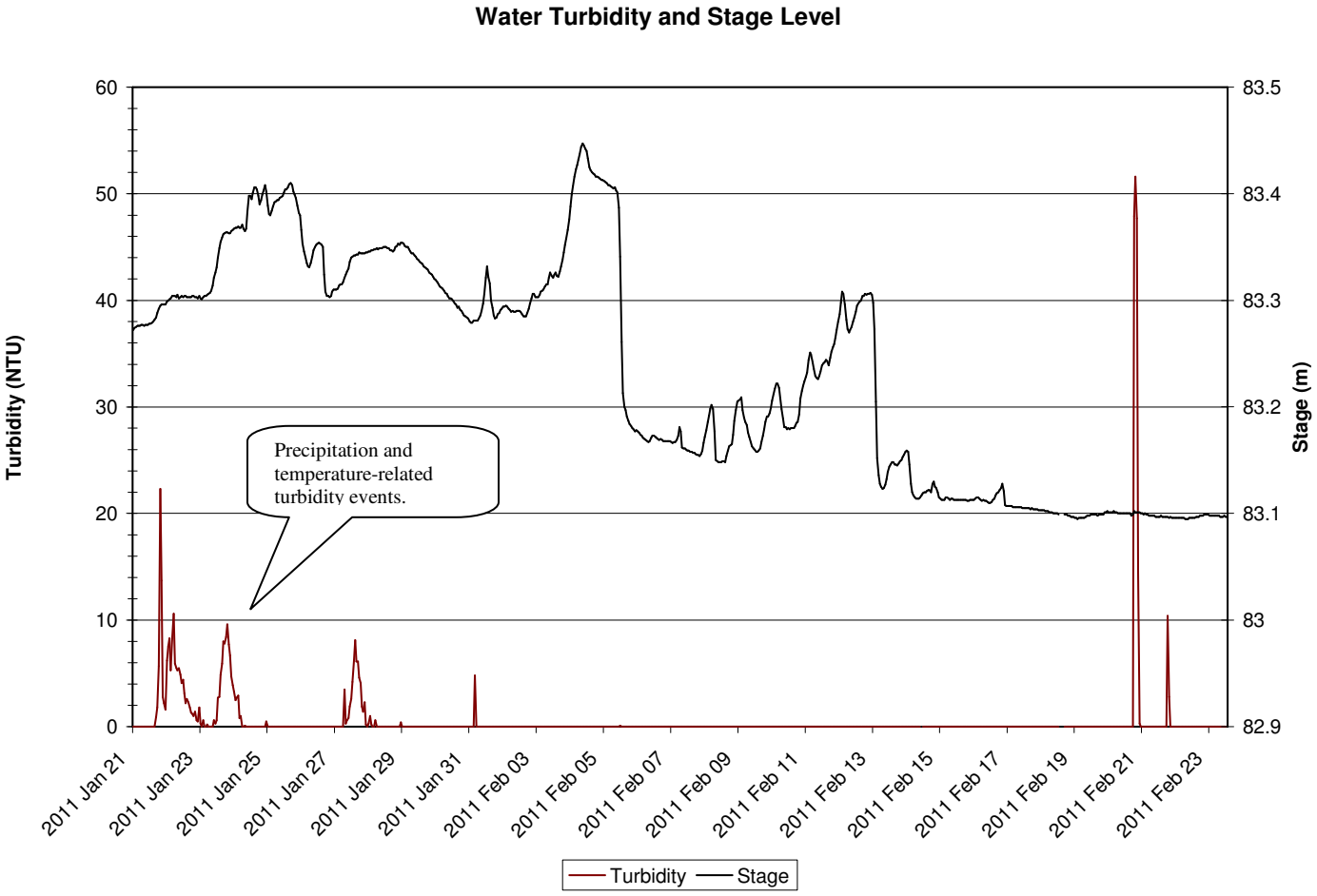
- As observed at Big Pond station, a steady rise in conductivity was noticed during this time period. Values ranged from 27.0 to 46.8 µS/cm during this time period.



- Dissolved Oxygen concentration and saturation was well above the CCME Guidelines from January 21st to February 24th. The concentration ranged from 13.64 to 14.87 mg/l (median = 14.45 mg/l) which is somewhat higher than values recorded at Big Pond. It is expected that the vigorously flowing water at Bridge station would have more oxygen than the relatively still waters in Big Pond.

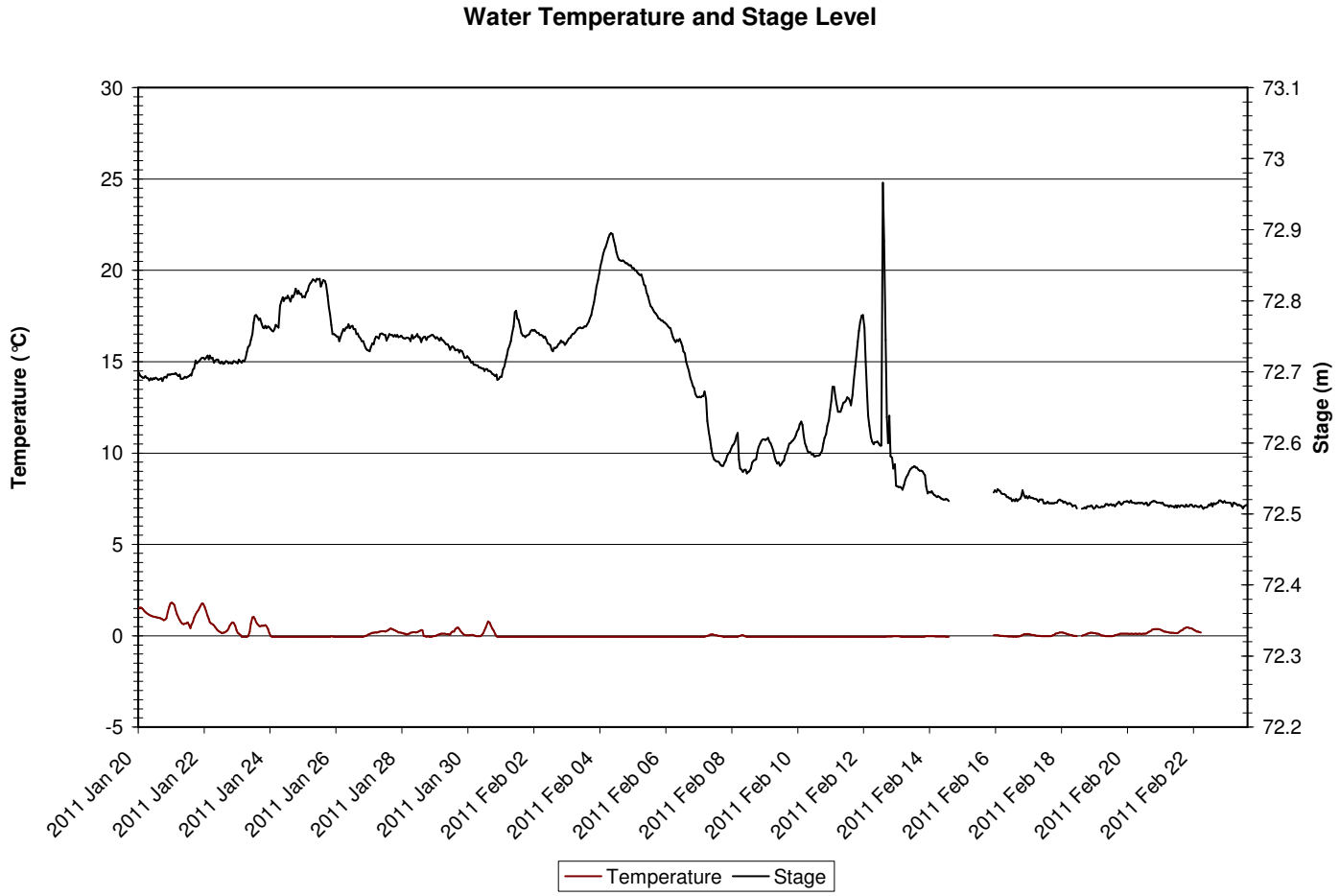


- Whereas no turbidity recordings were made at Big Pond station during this deployment, there were instances of turbidity at Bridge station on occasion.
- Values ranged from 0.0 to 51.6 NTU with an overwhelming majority of 0.0 NTU (median = 0.0). No alerts were generated by Bridge station (> 75 NTU) during this time frame. The spikes are found to occur in conjunction with precipitation and temperature maxima implying that snowmelt is likely responsible for releasing sediment into the river channel.

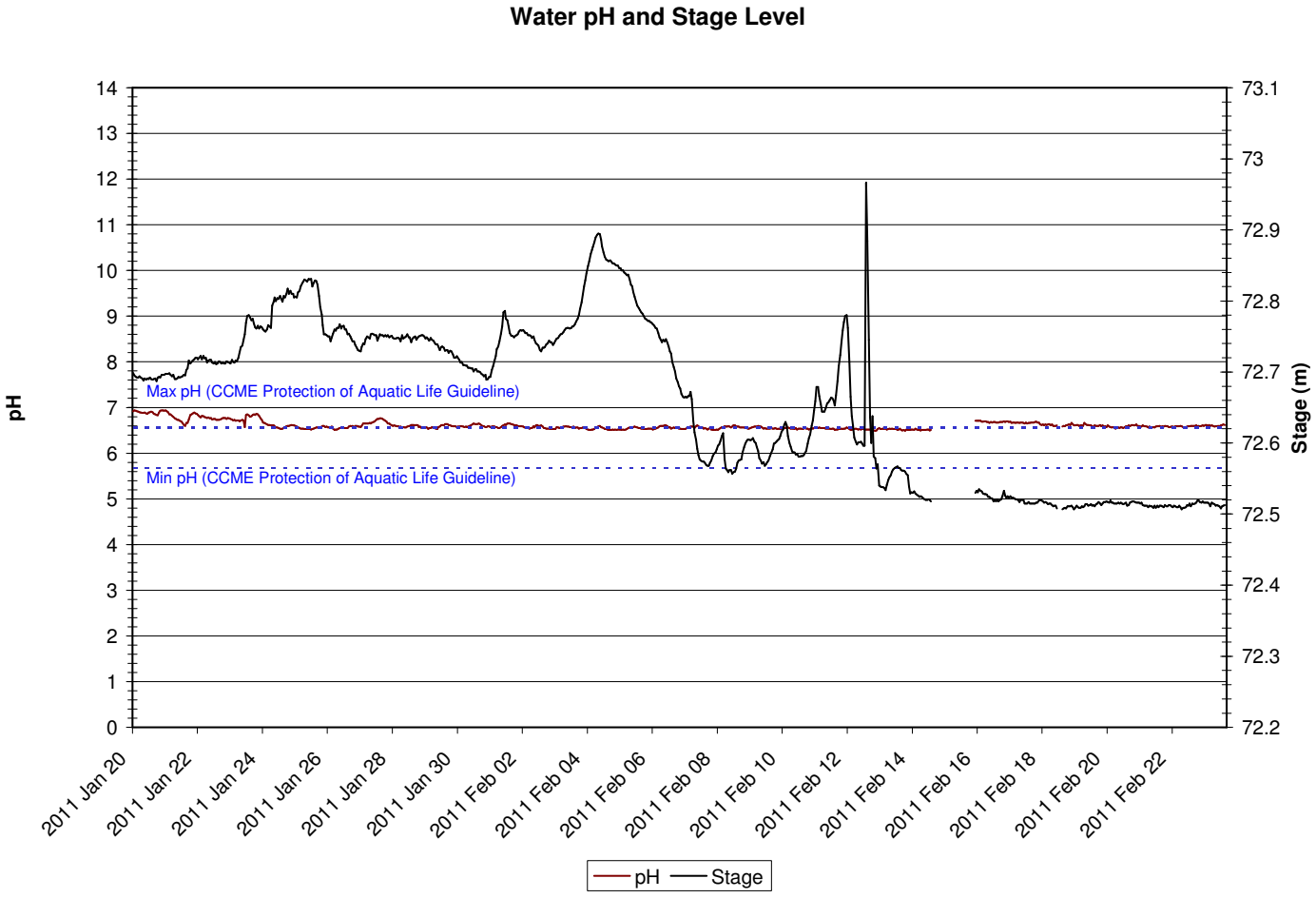


Rattling Brook below Plant Discharge

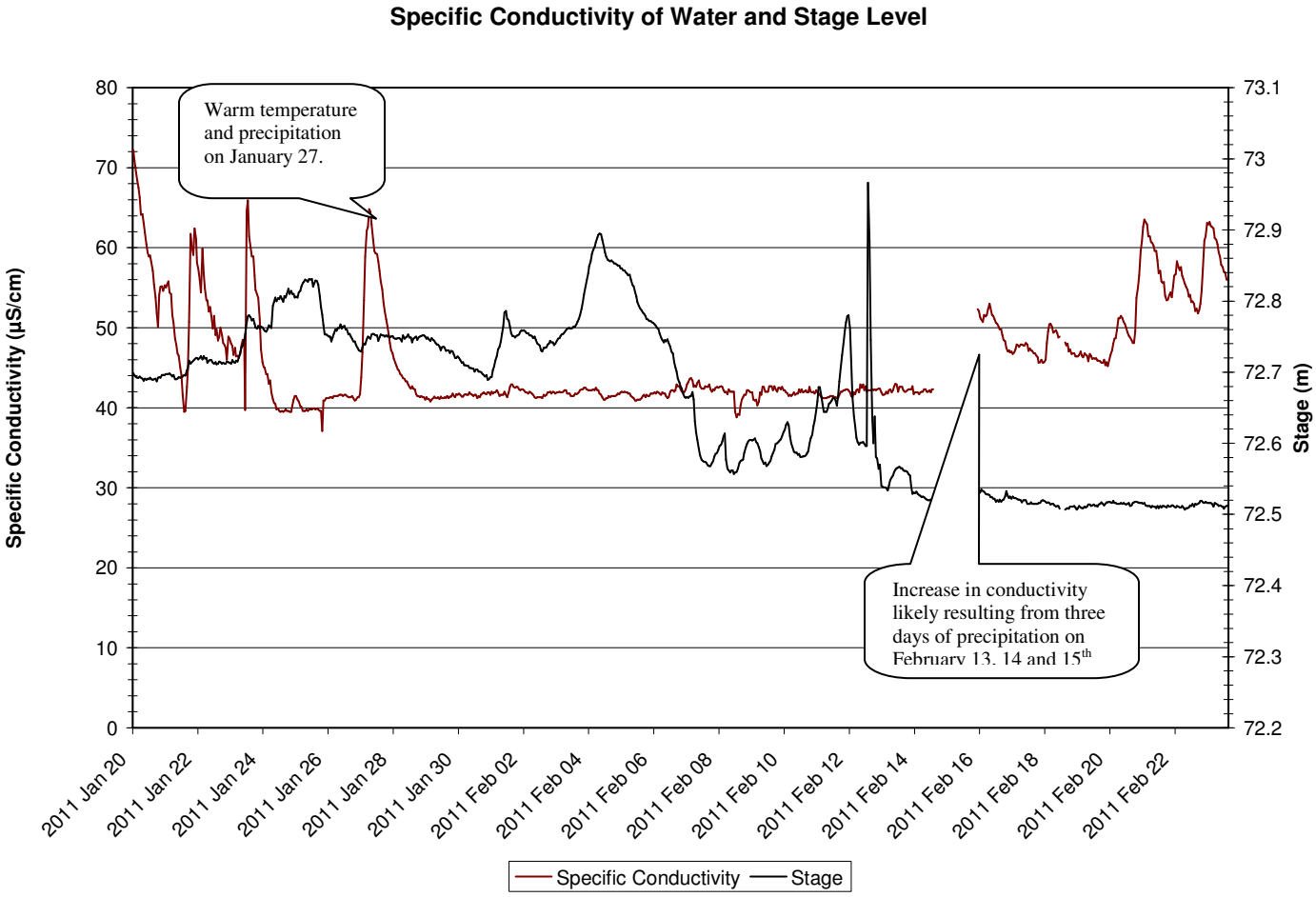
- A two-day transmission outage at Plant Discharge station left a gap in graphs during the last week of deployment. The resulting gaps in graphs may be closed through the use of a log recorded independent of the satellite communication system. As of report time, this log is not available but will be examined once it can be accessed. The data will be included in the annual report.
- During the deployment period from January 20th to February 24th, water temperature ranged form 1.80^{o}C to -0.07^{o}C (median = -0.04^{o}C) at Plant Discharge station. Water temperatures at Plant Discharge station were found to be higher than Bridge station up stream, possibly due to the close proximity of Murphy's Gully, 400 m upstream.



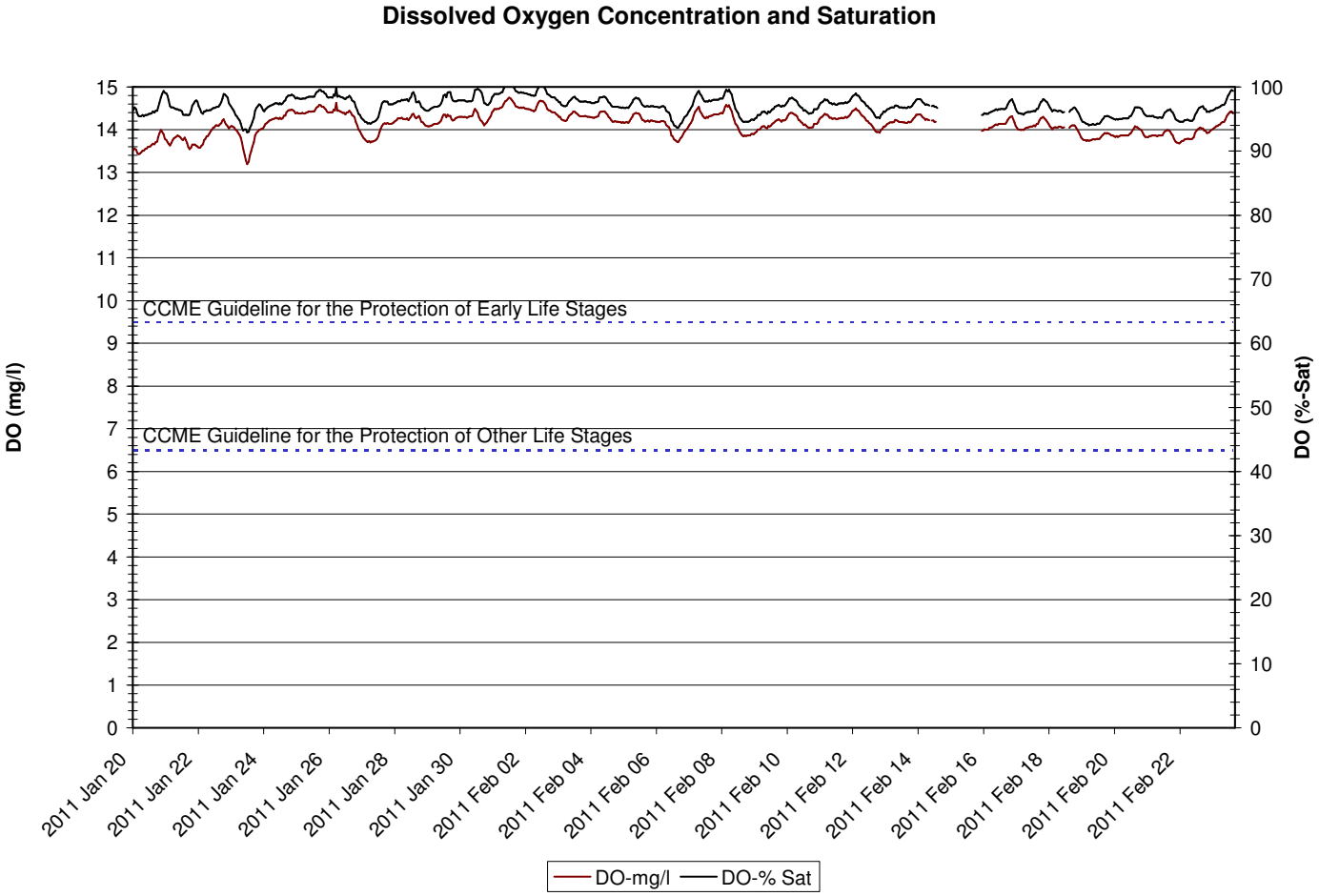
- During this deployment pH levels at Plant Discharge were found to be at the upper threshold of the SSGs for Rattling Brook. When the SSGs were developed it was decided that a simple, river-wide guideline was best. It was noticed, however, that the pH at Plant Discharge station tends to lean towards the upper end of the guideline.
- For this deployment, pH ranged from 6.49 to 6.94 with a median of 6.58 pH units, just above the upper SSG of 6.56. This will be monitored and may require an adjustment of the SSG in time if this continues to be an issue. For now, no concern is warranted.
- No event in particular was found to be of concern.



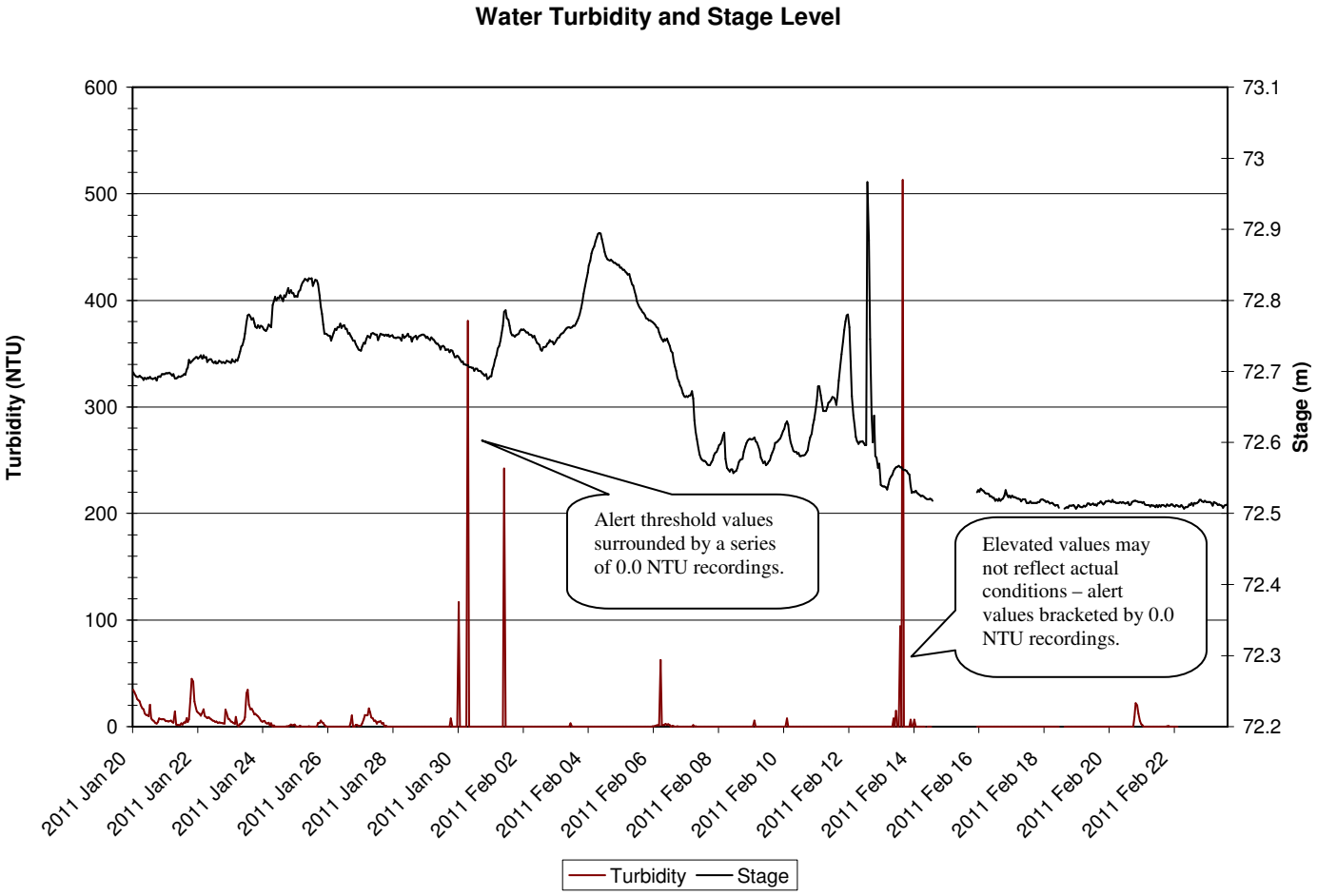
- A handful of peaks in specific conductivity are likely the result of warm air temperatures and precipitation. Conductivity appears to increase steadily after the precipitation event that occurred during the communication dropout.
- Values ranged from 37.1 to 72.2 µS/cm with a median of 42.3 µS/cm.



- Dissolved Oxygen concentration and saturation was well above CCME guidelines for this deployment period and no significant events were detected.
- DO concentration ranged from 13.19 to 14.75 mg/l (median = 14.17 mg/l).



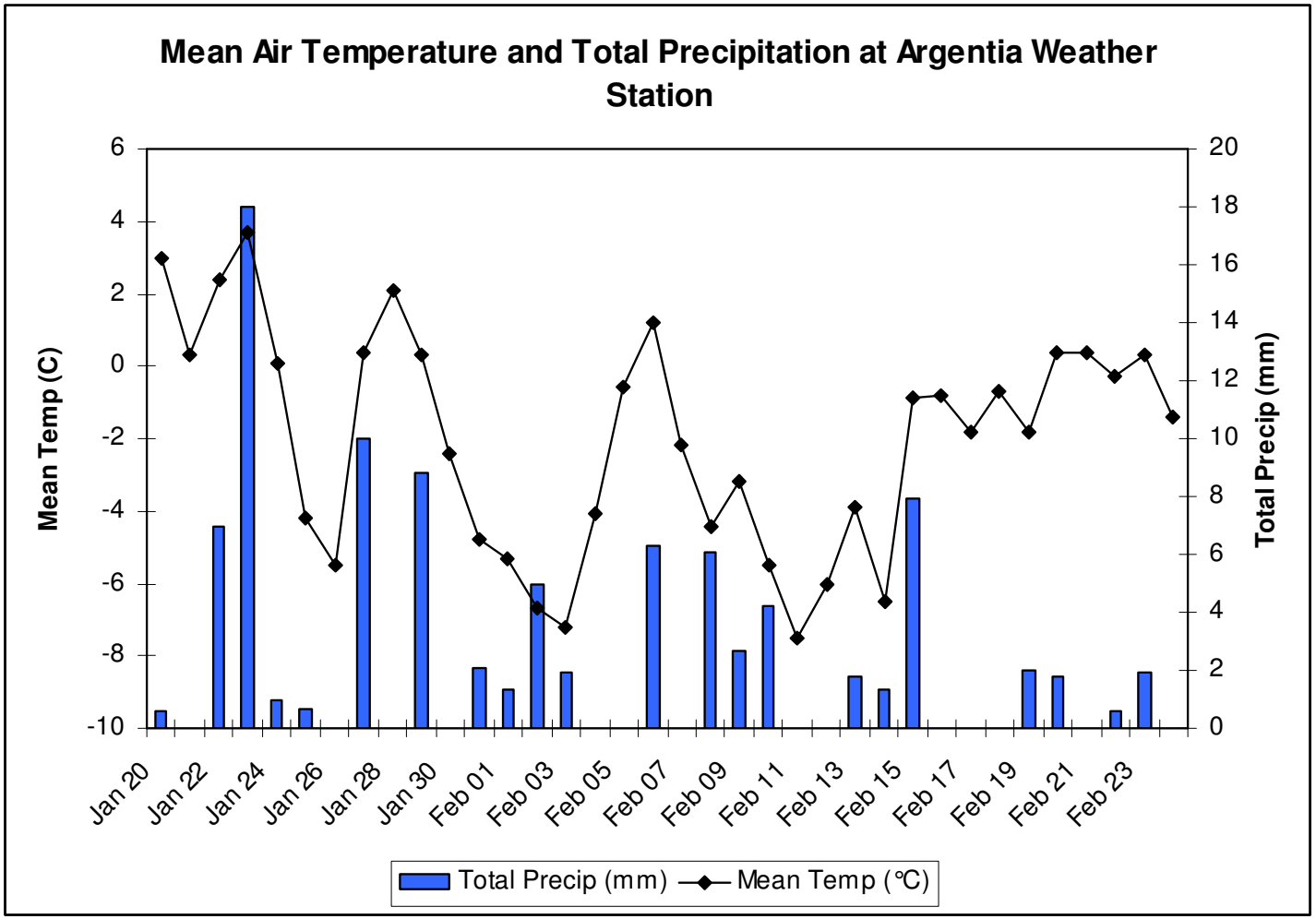
- Eight instances of turbidity values greater than the alert threshold of 40 NTU were recorded during this deployment period; however, several of these alert values were bracketed by numerous recordings of 0.0 NTU suggesting that a blockage of the sensor is the culprit.
- Turbidity ranged from 0.0 to 513.0 NTU for the deployment period with a median value of 0.0 NTU. This range and median indicates a highly skewed distribution of turbidity trending towards very low values – at least 50% of records indicate 0.0 NTU. No concern is warranted at this time.



Conclusions

- No events were detected that warrant further investigation or intervention.
- A period of approximately 2 days is missing from the graphs presented above for Rattling Brook below Plant Discharge. This data will be filled for the annual report.

Appendix



Prepared by:
Ryan Pugh
Department of Environment and Conservation
Water Resources Management Division
Phone: 709.729.1681
Fax: 709.729.3020